November 20, 1996

Ms. Ann Merwarth
Manager, HST Operations & Ground Systems Project
Goddard Space Flight Center - Code 441
Greenbelt, MD 20771

RE: HST VISION 2000 Program Review Panel Report

Dear Ann,

Attached is the report from the HST VISION 2000 Program Peer Review Panel. The Panel hopes that the inputs to you and the HST Team are helpful.

I have distributed the report to those listed below and have left the internal Project distribution for your office.

Sincerely,

Gael F. Squibb
Manager, NASA Data Services

Distribution
Preston Burch

Review Panel

Roger Brissenden SAO
David Kaslow   Lockheed Martin
George Morrow   GSFC (Not present for Panel Discussions)
Peter Shames   JPL
Ethan Schreier   STScI
Steve Tompkins   GSFC

HST VISION 2000 PROGRAM

REVIEW PANEL REPORT

TRANSITION READINESS REVIEW

November 19 - 20, 1996

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Gael F. Squibb
Chairman

November 20, 1996

Review Panel Members Present at the Design Confirmation Review

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Roger Brissenden -- SAO

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Dave Kaslow -- Lockheed Martin

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Ethan Schreier STScI

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Peter Shames JPL

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Steve Tompkins GSFC

The Vision 2000 (V2K) review was held at GSFC during the period November 19 through November 10, 1996. The purpose of the review was for the Review Panel to:
      Confirm the adequacy of Vision 2000:
           Risk Management
           Transition and Operations Planning
           Security Planning
     Assess:
           CCS team progress towards readiness for shadow operations in February 1997
           Flight Software team design progress
           Team Status for:
                Planing and Scheduling
                Science Data Processing
and to make comments to the HST O&GS Project Manager that will aid the Project in achieving the Vision presented. The Panel wishes to thank the presenters for the clarity and openness of the presentations that have enabled us to make comments that we hope will be helpful.

GENERAL

The Review Panel is pleased with the responsiveness to the April 1996 Review. All of the comments and observations were either answered or implemented.

The overall impression of the Review Panel is very positive and we congratulate the project on the achievements since the last review. The presenters were knowledgeable, showed ownership of the systems they represented, and the Panel observed that no question caught them off guard. The focus on customer needs by the presenters was good.

The next year will be critical from a development point of view as the project works to meet the Release 2.2 in August of 1997 while supporting the servicing mission in February of 1997. If the project remains on schedule through the servicing mission, the Panel is optimistic that the Release 2.2 will be met.

The HST Operations and Ground systems Project needs to develop separate labor profiles by fiscal year and functional element for Vision 2000 Development, Servicing Mission Support and on-going maintenance of the legacy system. The importance of understanding and conveying these separate yet interrelated profiles is of utmost importance in the budget climate that exists and will exist during the completion of the Vision 2000 project. The Panel supports the profile that was given for the total effort as shown below but believes that one who is not familiar with the project will need additional information to support the total HST effort.

Functional Area	1995	1996	1997	1998	1999	2000	2001
Planning & Scheduling	96	89	80	80	80	80	45
Spacecraft Operations	234	248	261	261	250	185	79
Data Processing & Archive	51	31	31	31	31	31	27
Flight Software	28	28	30	29	28	23	10
Totals	409	396	402	401	389	319	161

The last development milestone is complete in August 1999 yet the staffing for all PDT's remains either flat or slightly decreases through 2000.**The Panel recommends that the project re-evaluate the staffing profile with the current schedules and make them consistent.**

The Vision 2000 project is entering new ground in developing a state of the art system with a significant (up to 80% of release 1) use of COTS. No one on the Panel has experience in what the maintenance implications are on a system of this nature.**The Panel recommends that the project assess the experience, either in the government or with industry, in the maintenance aspects of a system with a high degree of COTS. We repeat our comment from the last report that the project should develop a dependence matrix relating COTS products to each other, the non-COTS S/W components and to the operating system(s). Understanding the effort required to maintain the COTS within the system and the associated licensing costs, is critical to understanding the resource needs for ongoing total system maintenance. This topic should be addressed at the next review.**

The Panel continues to be impressed with the close working relationship that exists between the Civil Service staff, the contractors and the STScI. It is this teamwork that is enabling the V2000 project to remain on schedule and meet the requirements and arrive at innovative and effective design solutions.

The Panel is appreciative and impressed with the demonstrations given.

The Panel thanks the Vision 2000 Project for the opportunity to participate in the review of a system that is using new technologies and innovative processes. The members find the reviews as a good source of technologies and methodologies which can be used in our own related endeavors.

We conclude that the Vision 2000 project is ready for transition.

SYSTEM

The CCS is beginning to experience requirements migration from release to release. It is the experience of the members of the Panel that this will continue throughout the development period**The Panel recommends that the Project review the requirements with an eye towards deleting requirements whose value is not commensurate with the effort or risk associated with developing them. This process should include the users justifying why the requirements should be kept as well as developers justifying why the requirements should be deleted. The process should also result in a prioritized list that can be used with little analysis during periods of high stress (schedule problems)**.

The Panel notes that considerable good work has been done in the risk management area. This area should continue to receive management attention and an effort should be undertaken to ensure that technical risks are addressed at the same level as management risk.

The Panel recommends that a proactive testing effort be undertaken to ensure that there are no problems with the year 2000 boundary.

The CCS is experiencing problems in retaining experienced personnel due to the current job market**The Panel supports V2000 efforts to put in place monetary incentive approach to help alleviate this problem**. The Panel is also concerned with the gap in the CCS schedule that indicates no activity between April and September of 1998. The explanation given was that preparation for the 99 servicing mission would fill the gap. Without seeing a more detailed schedule of the work the Panel is concerned that the talents of the S/W development staff will not be used to the best advantage or that the really good developers will look for other work during this period.**The specific usage of the development staff during this 'gap' should be addressed at the next review.**

The Panel is encouraged by the use of performance models to evaluate the design**As the development proceeds through 2.1, the model should be validated using actual performance of the delivered**

system. A presentation of the results of this validation and the differences to the model should be presented at the next review.
The Panel recognizes that the concepts for system failover are just in the initial stages of development. The failover processes and re-initialization of software and data can be very difficult**The Panel would like to see the progress made in the development of the concepts and the associated design and plans for validation at the next review.**

The Panel observes that the amount of VMS code in the system is more at this review than at the last review. This may reflect reality, however,**the panel urges the V2000 system to develop a plan to remove VMS dependence. The Panel also encourages an active program of validating software portability across the supported platforms and a reassessment of the cost to do this. This plan should be addressed at the next review.**

The Panel observes that the security approach and the plans in place for validating the security are in good shape. **The Panel recommends that the Project develop a systematic validation process of the V2000 security, such as a set of tests or procedures that are performed as part of the readiness review prior to each operational release.** The Panel would like t be briefed on the results of the NSA review currently planed when it is completed.

CONTROL CENTER SYSTEM

The Panel is impressed with the thoroughness of the code walk-through process and the tools that are being used for the system engineering of the CCS.

The Panel strongly agrees with the process of providing operators with workstations for both the existing system and Vision 2000 early in the schedule. The shadow system usage during the servicing mission in February 1997 will provide critical feedback to the development team.**The Panel recommends that the Project formalize the feedback process from the operators to the development team.**

PLANNING & SCHEDULING SYSTEM

The on schedule transition of the scheduling functions at the STScI and the corresponding increase in scheduling efficiency is very impressive.

SCIENCE DATA PROCESSING

One of the Panel member observes that HST may be the only mission or one of only a few missions on PACORII by the year 2001. **The Panel recommends that prior to the end of the Vision 2000 effort, the PACORII mission loading and costs should be evaluated to determine if converting to a single mission solution or relocation of the function is warranted.**

SSM FLIGHT SOFTWARE DEVELOPMENT

The Panel has no concerns. We endorse the early use of the simulator.

FUTURE REVIEWS

The Panel would suggest that a short schedule and status review be held in the April 1997 time period. The Panel believes that a review of how the schedule was maintained during the February servicing mission, and the validation of existing schedules or discussion of new schedules in that time period will be beneficial to the Project.